YAKEEN NEET 2.0

2026

H/W solution

Basic Maths and Calculus (Mathematical Tools)

Physics

Homework Solution-09 (of Lec-15)

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Question

11/10

If velocity of object $V = 2t + 1$ then find average velocity in 2 sec. ($t_i = 0$ to $t_f = 2$ sec)

$$V = 2t + 1$$

$$\langle V_{Avg} \rangle = \frac{\int V\,dt}{\int dt} = \frac{\int_0^2 (2t+1)\,dt}{\int_0^2 dt} = \frac{\int_0^2 2t\,dt + \int_0^2 dt}{(t)_0^2} = \frac{2\left(\frac{t^2}{2}\right)_0^2 + (t)_0^2}{(t)_0^2}$$

$$= \frac{[(2)^2 - 0] + (2-0)}{2-0} = \frac{4}{2} = 3$$

$$\frac{1}{(1.004)^2} = (1.004)^{-2}$$

$$= (1 + 0.004)^{-2} = (1 - 0.008)$$

$$= 0.992 \checkmark$$

$$= [1 + (-2) \times 0.004]$$

hint

H/W

H/W

$$\sqrt{1.006} = \sqrt{1.006} = (1.006)^{1/2} = (1+0.006)^{1/2}$$

$$= 1 + \frac{0.006}{2}$$

$$= 1 + 0.003$$

$$= 1.003$$

$$(1+x)^n = 1+nx$$

$$\sqrt{0.99} = (1-0.01)^{1/2}$$

$$= \left(1 - \frac{0.01}{2}\right) = 1 - 0.005$$

$$= 0.995$$

$$\sqrt{0.96} = (1-0.04)^{1/2}$$

$$= 1 - \frac{0.04}{2} = 1 - 0.02 = 0.980 \simeq 0.975 \simeq \underline{0.98}$$

$x \ll 1$

$$(1+x)^{-n} = 1-nx$$

$$(1-x)^n = 1-nx$$

$$(1-x)^{-n} = 1+nx$$

H/W

$$\frac{1}{(0.96)^2} = (0.96)^{-2} = (1-0.04)^{-2} = 1 + 0.08 = 1.08 \checkmark$$

$$\frac{1}{(1.04)} = \frac{1}{(1.04)} = \frac{1}{(1+0.04)^2} = (1+0.04)^{-1} = 1 - 0.04 = \underline{0.96}$$

H/W

$$\sqrt{0.98} = (1 - 0.02)^{1/2}$$

$$= 1 - 0.02 \times \frac{1}{2}$$

$$= 1 - 0.01$$

$$= 0.99.$$

H/W

$$\int \sin^2\theta \, d\theta$$

hint →

$$\cos 2\theta = \cos^2\theta - \sin^2\theta$$

$$\cos(2\theta) = 1 - 2\sin^2\theta$$

$$2\sin^2\theta = 1 - \cos(2\theta)$$

$$\sin^2\theta = \frac{1}{2} - \frac{\cos(2\theta)}{2}$$

use this

$$\int \sin^2\theta \, d\theta = \int (\sin\theta)^2 \, d\theta = \frac{(\sin\theta)^3}{3}$$

$$\int x^n \, dx = \frac{x^{n+1}}{n+1}$$

$(101)^3 = ??$

$(100)^3 = (10^2)^3 = \underline{10^6}$

do it $(100+1)^3 =$

$$\left(100\left(1+\frac{1}{100}\right)\right)^3$$

$$= (100)^3\left(1+\frac{1}{100}\right)^3$$

$$= (100)^3\left(1+\frac{3}{100}\right)$$

$$= (100)^3\left(\frac{103}{100}\right)$$

$$= 1000000 \times \frac{103}{100} = 103 \times 10^4$$ ✓

$(10.01)^2 = ??$

$(10+0.01)^2 = \left(10(1+0.001)\right)^2$

$= 10^2\left(1 + \underline{0.001 \times 2}\right)$

$= 10^2(1 + 0.002)$

$= 10^2(1.002)$

$= \underline{100.2}$

$$\int \frac{1}{(ax+b)}\,dx = \int (ax+b)^{-1}\,dx = \frac{\log(ax+b)}{a} + C$$

$$\int \frac{1}{(ax+b)^2}\,dx = \log(ax+b)^2 \quad \times$$

$$\int \frac{1}{x}\,dx = \int x^{-2}\,dx = \log x + C$$

$$\int \frac{1}{x^2}\,dx = \log x^2 \quad \times$$

$$\int \sin^2\theta \, d\theta = \int \frac{1-\cos(2\theta)}{2} \, d\theta$$

$$= \int \frac{1}{2} d\theta - \int \frac{\cos(2\theta)}{2} d\theta$$

$$= \frac{1}{2}\theta - \frac{\sin(2\theta)}{2\times 2}$$

$$= \frac{\theta}{2} - \frac{\sin(2\theta)}{4}$$

$$\cos(2\theta) = \cos^2\theta - \sin^2\theta$$

$$\cos(2\theta) = 1 - 2\sin^2\theta$$

$$2\sin^2\theta = 1 - \cos(2\theta)$$

$$\boxed{\sin^2\theta = \frac{1-\cos(2\theta)}{2}}$$

☆

THANK YOU